

Title (en)

HIGH AFFINITY PD-1 AGENTS AND METHODS OF USE

Title (de)

HOCHAFFINE PD-1-WIRKSTOFFE UND VERFAHREN ZUR VERWENDUNG

Title (fr)

AGENTS PD-1 À HAUTE AFFINITÉ ET PROCÉDÉS D'UTILISATION

Publication

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Application

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Abstract (en)

High affinity PD-1 mimic polypeptides are provided, which (i) comprise at least one amino acid change relative to a wild-type PD-1 protein; and (ii) have an increased affinity for PD-L1 relative to the wild-type protein. Compositions and methods are provided for modulating the activity of immune cells in a mammal by administering a therapeutic dose of a pharmaceutical composition comprising a high affinity PD-1 mimic polypeptide, which blocks the physiological binding interaction between PD-1 and its ligand PD-L1 and/or PD-L2.

IPC 8 full level

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Citation (applicant)

- US 201462035316 P 20140808
- US 201562150789 P 20150421
- US 7169874 B2 200701030 - SALAMONE JOSEPH C [US], et al
- WO 0118048 A2 20010315 - INTROGENE BV [NL], et al
- WO 9412649 A2 19940609 - GENZYME CORP [US]
- WO 9303769 A1 19930304 - US HEALTH [US]
- WO 9319191 A1 19930930 - CENTRE NAT RECH SCIENT [FR], et al
- WO 9428938 A1 19941222 - UNIV MICHIGAN [US]
- WO 9511984 A2 19950504 - CANJI INC [US]
- WO 9500655 A1 19950105 - UNIV MCMASTER [CA]
- WO 9309239 A1 19930513 - RES CORP TECHNOLOGIES INC [US]
- KWON ET AL., PROC. NATL. ACAD. SCI U.S.A., vol. 96, 1999, pages 15074 - 9
- CLOTHIA ET AL., J. MOL. BIOL., vol. 186, 1985, pages 651
- NOVOTNYHABER, PROC. NATL. ACAD. SCI. U.S.A., vol. 82, 1985, pages 4592
- KANEDA ET AL., NEURON, vol. 6, 1991, pages 583 - 594
- PARMACEK ET AL., MOL. CELL. BIOL., vol. 113, 1994, pages 1870 - 1885
- PLATT ET AL., PROC. NATL. ACAD. SCI. USA, vol. 86, 1989, pages 7490 - 824
- WILSON, CELL, vol. 37, 1984, pages 767
- GRAHAM ET AL., J. GEN VIROL., vol. 36, 1977, pages 59
- URLAUB ET AL., PROC. NATL. ACAD. SCI. USA, vol. 77, 1980, pages 4216
- MATHER, BIOL. REPROD., vol. 23, 1980, pages 243 - 251
- MATHER ET AL., ANNALS N.Y. ACAD. SCI., vol. 383, pages 44 - 68
- MIYAGISHI ET AL., NATURE BIOTECHNOLOGY, vol. 20, 2002, pages 497 - 500
- XIA ET AL., NUCLEIC ACIDS RES., vol. 31, no. 17, 1 September 2003 (2003-09-01)
- CHEN ET AL., CELL, vol. 51, 1987, pages 7 - 19
- LLEWELLYN ET AL., NAT. MED., vol. 16, no. 10, 2010, pages 1161 - 1166
- OH ET AL., GENE THER, vol. 16, 2009, pages 437
- SASAOKA ET AL., MOL. BRAIN RES., vol. 16, 1992, pages 274
- BOUNDY ET AL., J. NEUROSCI., vol. 18, 1998, pages 9989
- RADOVICK ET AL., PROC. NATL. ACAD. SCI. USA, vol. 88, 1991, pages 3402 - 3406
- OBERDICK ET AL., SCIENCE, vol. 249, 1990, pages 1527 - 226
- BARTGE ET AL., PROC. NATL. ACAD. SCI. USA, vol. 85, 1988, pages 3648 - 3652
- COMB ET AL., EMBO J., vol. 17, 1988, pages 3793 - 3805
- MAYFORD ET AL., PROC. NATL. ACAD. SCI. USA, vol. 93, 1996, pages 13250
- CASANOVA ET AL., GENESIS, vol. 31, 2001, pages 37
- LIU ET AL., GENE THERAPY, vol. 11, 2004, pages 52 - 60
- TOZZO ET AL., ENDOCRINOL., vol. 138, 1997, pages 1604
- ROSS ET AL., PROC. NATL. ACAD. SCI. USA, vol. 87, 1990, pages 9590
- PAVJANI ET AL., NAT. MED., vol. 11, 2005, pages 797
- KNIGHT ET AL., PROC. NATL. ACAD. SCI. USA, vol. 100, 2003, pages 14725
- KURIKI ET AL., BIOL. PHARM. BULL., vol. 25, 2002, pages 1476
- SATO ET AL., J. BIOL. CHEM., vol. 277, 2002, pages 15703
- TABOR ET AL., J. BIOL. CHEM., vol. 274, 1999, pages 20603
- MASON ET AL., ENDOCRINOL., vol. 139, 1998, pages 1013
- CHEN ET AL., BIOCHEM. BIOPHYS. RES. COMM., vol. 262, 1999, pages 187
- KITA ET AL., BIOCHEM. BIOPHYS. RES. COMM., vol. 331, 2005, pages 484

- CHAKRABARTI, ENDOCRINOL., vol. 151, 2010, pages 2408
- SEO ET AL., MOLEC. ENDOCRINOL., vol. 17, 2003, pages 1522
- FRANZ ET AL., CARDIOVASC. RES., vol. 35, 1997, pages 560 - 566
- ROBBINS ET AL., ANN. N.Y. ACAD. SCI., vol. 752, 1995, pages 492 - 505
- LINN ET AL., CIRC. RES., vol. 76, 1995, pages 584 - 591
- HUNTER ET AL., HYPERTENSION, vol. 22, 1993, pages 608 - 617
- SARTORELLI ET AL., PROC. NATL. ACAD. SCI. USA, vol. 89, 1992, pages 4047 - 4051
- AKYUREK ET AL., MOL. MED., vol. 6, 2000, pages 983
- KIM ET AL., MOL. CELL. BIOL., vol. 17, 1997, pages 2266 - 2278
- LI ET AL., J. CELL. BIOL., vol. 132, 1996, pages 849 - 859
- MOESSLER ET AL., DEVELOPMENT, vol. 122, 1996, pages 2415 - 2425
- YOUNG ET AL., OPHTHALMOL. VIS. SCI., vol. 44, 2003, pages 4076
- NICOUD ET AL., J. GENE MED., vol. 9, 2007, pages 1015
- YOKOYAMA ET AL., EXP. EYE RES., vol. 55, 1992, pages 225
- LI ET AL., INVEST. OPHTHALMOL. VIS. SCI., vol. 35, 1994, pages 2543 2549
- BORRAS ET AL., GENE THER., vol. 6, 1999, pages 515 524
- LIDAVISON, PNAS, vol. 92, 1995, pages 7700 7704
- SAKAMOTO ET AL., H. GENE THER., vol. 5, 1999, pages 1088 1097
- ALI ET AL., HUM. GENE THER., vol. 9, 1998, pages 81 86
- FLANNERY ET AL., PNAS, vol. 94, 1997, pages 6916 6921
- BENNETT ET AL., INVEST. OPHTHALMOL. VIS. SCI., vol. 38, 1997, pages 2857 2863
- JOMARY ET AL., GENE THER., vol. 4, 1997, pages 683 690
- ROLLING ET AL., HUM. GENE THER., vol. 10, 1999, pages 641 648
- ALI ET AL., HUM. MOL. GENET., vol. 5, 1996, pages 591 594
- SAMULSKI ET AL., J. VIR., vol. 63, 1989, pages 3822 - 3828
- MENDELSON ET AL., VIROL., vol. 166, 1988, pages 154 - 165
- FLOTTE ET AL., PNAS, vol. 90, 1993, pages 10613 - 10617
- TAKAHASHI ET AL., J. VIROL., vol. 73, 1999, pages 7812 7816
- BITTER ET AL., METHODS IN ENZYMOLOGY, vol. 153, 1987, pages 516 - 544
- HANES, ADVANCED DRUG DELIVERY REVIEWS, vol. 28, 1997, pages 97 - 119

Citation (search report)

- [A] US 2011159023 A1 20110630 - LANGERMANN SOLOMON [US]
- [A] DAVID YIN-WEI LIN ET AL: "The PD-1/PD-L1 complex resembles the antigen-binding Fv domains of antibodies and T cell receptors", vol. 105, no. 8, 26 February 2008 (2008-02-26), pages 3011 - 3016, XP002683218, ISSN: 0027-8424, Retrieved from the Internet <URL:<http://www.pnas.org/content/105/8/3011>> [retrieved on 20080214], DOI: 10.1073/PNAS.0712278105
- [A] TOPALIAN SUZANNE L ET AL: "Safety, activity, and immune correlates of anti-PD-1 antibody in cancer", NEW ENGLAND JOURNAL OF MEDICINE, THE - NEJM, MASSACHUSETTS MEDICAL SOCIETY, US, vol. 366, no. 26, 28 June 2012 (2012-06-28), pages 2443 - 2454, XP002767416, ISSN: 1533-4406
- [A] DAWN E DOLAN ET AL: "Reports Outline Tumors Findings from Moffitt Cancer Center (PD-1 pathway inhibitors: changing the landscape of cancer immunotherapy) (PD-1 pathway inhibitors: changing the landscape of cancer immunotherapy)", CANCER VACCINE WEEK, vol. 21, 1 July 2014 (2014-07-01), US, pages 3, XP055428249, ISSN: 1543-6810
- [T] MAUTE ROY L ET AL: "Engineering high-affinity PD-1 variants for optimized immunotherapy and immuno-PET imaging", PROCEEDINGS NATIONAL ACADEMY OF SCIENCES PNAS, NATIONAL ACADEMY OF SCIENCES, US, vol. 112, no. 47, 1 November 2015 (2015-11-01), pages E6506 - E6514, XP002772779, ISSN: 0027-8424

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